

Crowsnest Coal Reserves

Mistaken Value of AB's Eastern Slopes Coal Reserves

Metallurgical Coal Quality and Market Value

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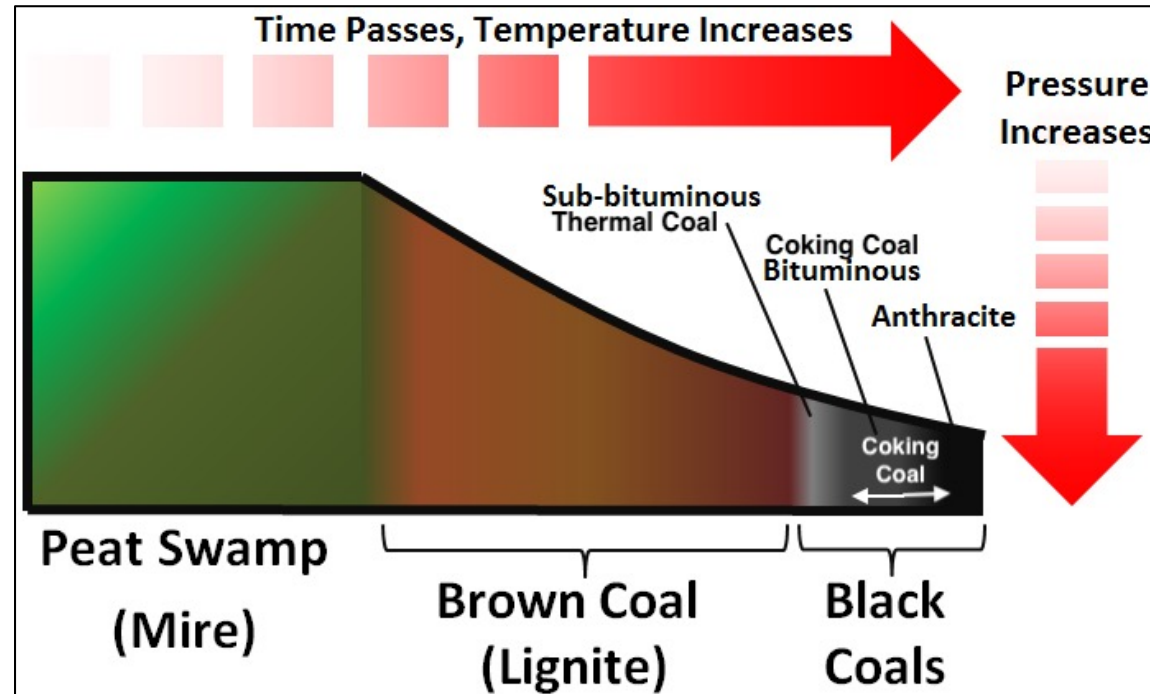
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EXECUTIVE SUMMARY – Crowsnest and Eastern Slopes Coal Reserves

- Alberta's Metallurgical Coking Coal Mines east of the BC border and the Crowsnest Pass area, from Bellevue to Coleman, were shutting down in 1960's and 1970's. The mines shut down due to inadequate quality and low market value of their Metallurgical Coal, combined with increasing quality requirements for the modernizing steel industry.
- The Japanese Steel Industry were key customers and partners in these mines. Their rejection of the coal and withdrawal triggered many shutdowns. As the shutdowns were taking place, the Elk Valley coal Resources in BC became technically and economically viable, utilizing improved mining technology and equipment, producing superior quality and higher Market Value Metallurgical Coal.
- During the past years speculative mining initiatives were developed. However, mostly lacking adequate exploration data and economical assessment, economic viability of these projects remains uncertain. Available coal quality data indicates the coal's quality and market value to be well below that of BC's Elk Valley's coals. The projected Job creation, Tax and Royalty revenues are likely to be overstated.
- Global Blast Furnace Ironmaking Tonnage is projected to gradually decline over the coming decades. The process will be made more efficient, requiring less coke. This trend will reduce the ever more competitive Seaborne Coking Coal Market volumes, demanding higher quality coal products. Global steel consumption's increase is projected to be met by Alternate Ironmaking Technologies.
- Were the speculative mining projects to become operational, the abovementioned developments potentially present Alberta with the risk of failing mines. Mine closures and inadequate funds for costly Remediation and Selenium Management will leave Alberta with the liabilities.

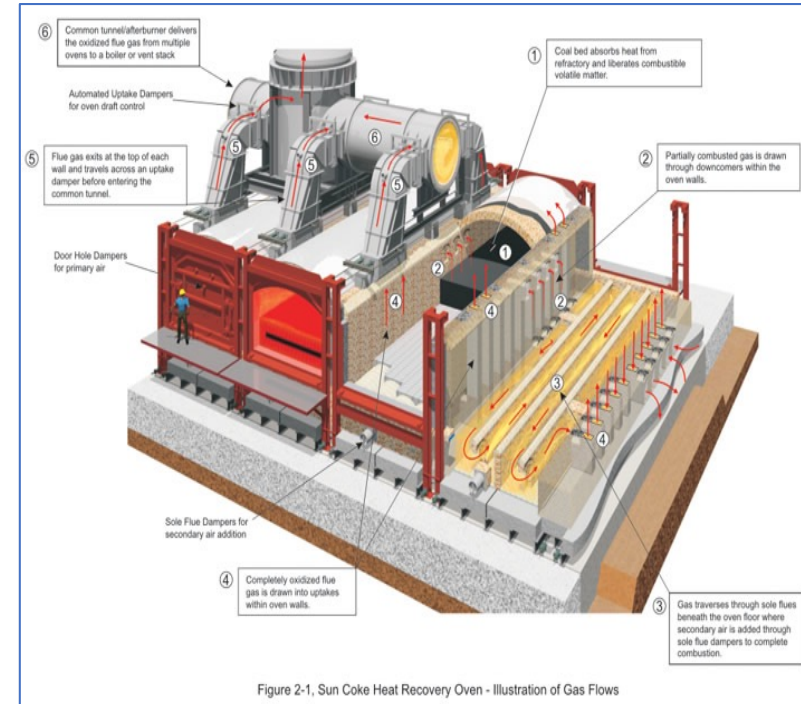
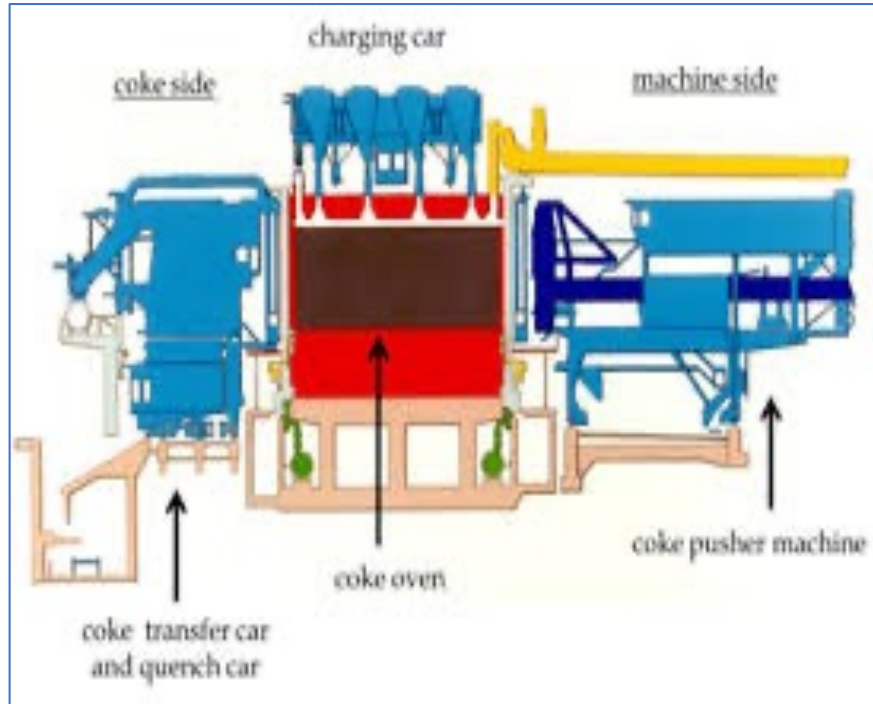
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1. The Difference between Metallurgical Coking Coal and Thermal Coal



- Died-off vegetation accumulates under water in swamps. As this organic material gets buried, pressure and temperature increase, forming coal over a period of 160mln to 135mln years in the Crowsnest deposits.
- Bituminous Coking Coals form coke when heated to 1100°C in airtight ovens after releasing gas, light oils and tar, melting and solidifying to coke “chunks”.
- Younger, lower \$-value Thermal coals for power stations don't form coke.

2. How Coke is made from Metallurgical Coking Coal



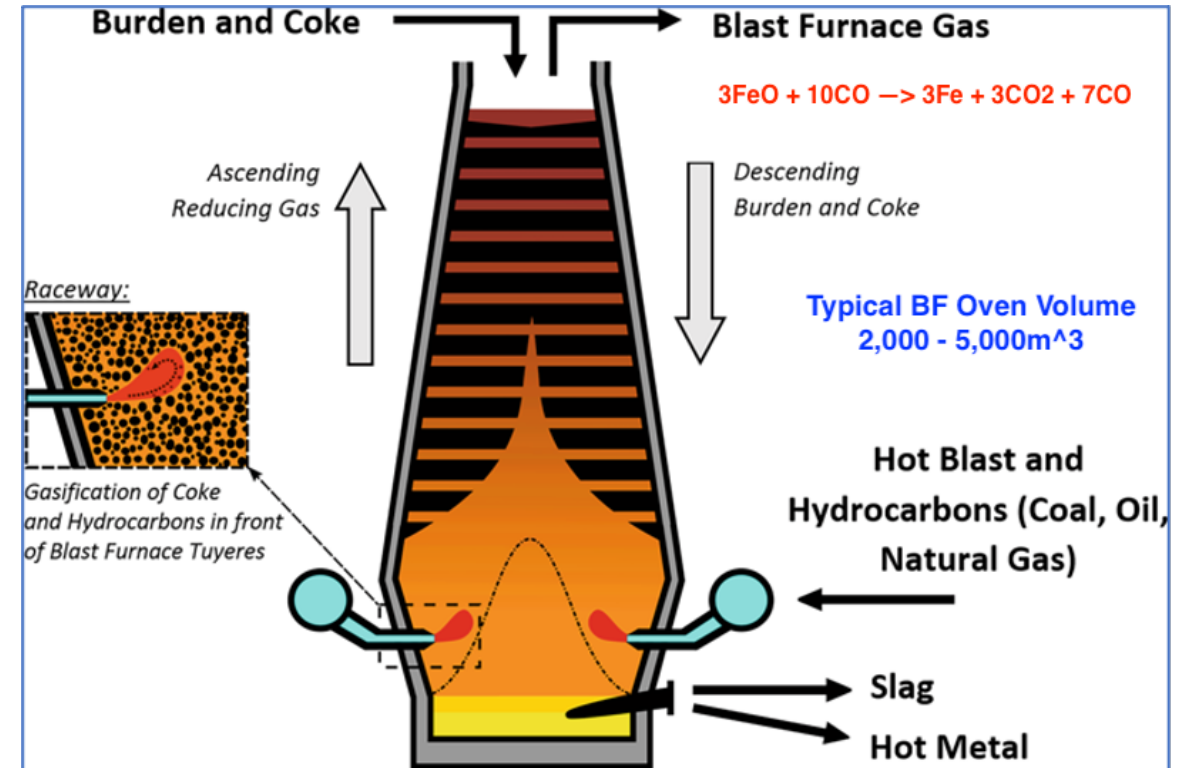
- Blast Furnace Coke is made of an optimized Blend of typically 8 Metallurgical Coals. Coke Strength and Chemistry meet specific targets to satisfy the Blast Furnace process.
- The Blend is carbonized in 30 – 50 Tonne capacity closed ovens during 16 to 48 hours.
- Coal “Fluidity” is important during the Coal’s “molten” phase as the coke structure is formed and solidifies. Coke Strength after Reaction (CSR) is important in the Blast Furnace as the coke is exposed to aggressive process gas above the 1100°C as liquid iron is formed.

3. How Coke is Used to make Iron in the Blast Furnace Process

A larger Blast Furnace (BF) typically produces over 3mln Tonnes/y iron.

Iron Ore and Coke are alternately charged into the top. Through the tuyeres, super-heated 1200°C oxygen-enriched Hot Blast is blown into the BF, forming CO for Iron Ore reduction.

Iron Ore melts as it reaches 1100-1400°C to be reduced to liquid Iron, which is tapped with liquid slag from the bottom of the BF at ~1500°C. Coke remains solid to the BF bottom for support.

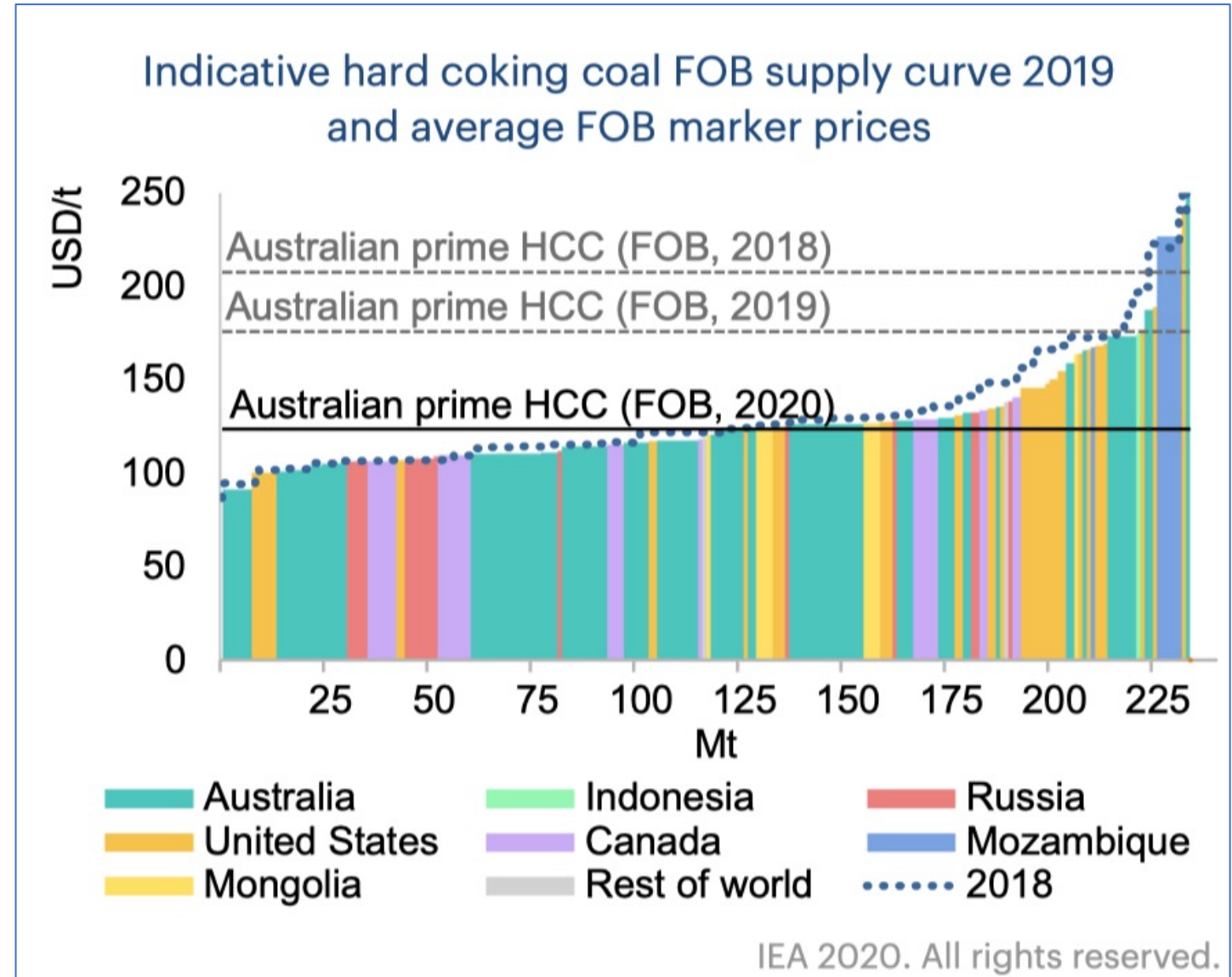


After tapping from the BF, liquid iron and slag are separated. The liquid iron is refined into steel in the steel-shop, where Carbon and impurities (Sulfur, Phos) are removed.

The BF process needs strong coke, CSR typically 65, range 63 to 68, depending on the size of the BF, fuel injection rates and required productivity. The larger the BF, the higher the fuel injection rates and productivity, the higher the CSR requirement.

4. Seaborne Coking Coal Markets – Decreasing Supply Costs & Deteriorating Prices

- Seaborne Metallurgical Coal trade is approx. 270 to 310 million Tonnes/Y during 2018 to 2021. (All grades incl. PCI*)
- Main Seaborne Met-Coal suppliers: Australia ~60%, USA ~14%, Canada ~12%, Russia ~9% of Trade.
- Although the coal supply costs tend to decrease, coal prices deteriorated more.
- Prime Hard Coking Coal (PHCC) is the highest valued grade.
- The graph shows the Hard Coking Coal Supply Curve and Average PHCC price of 2018, 2019 and Jan-Oct 2020.



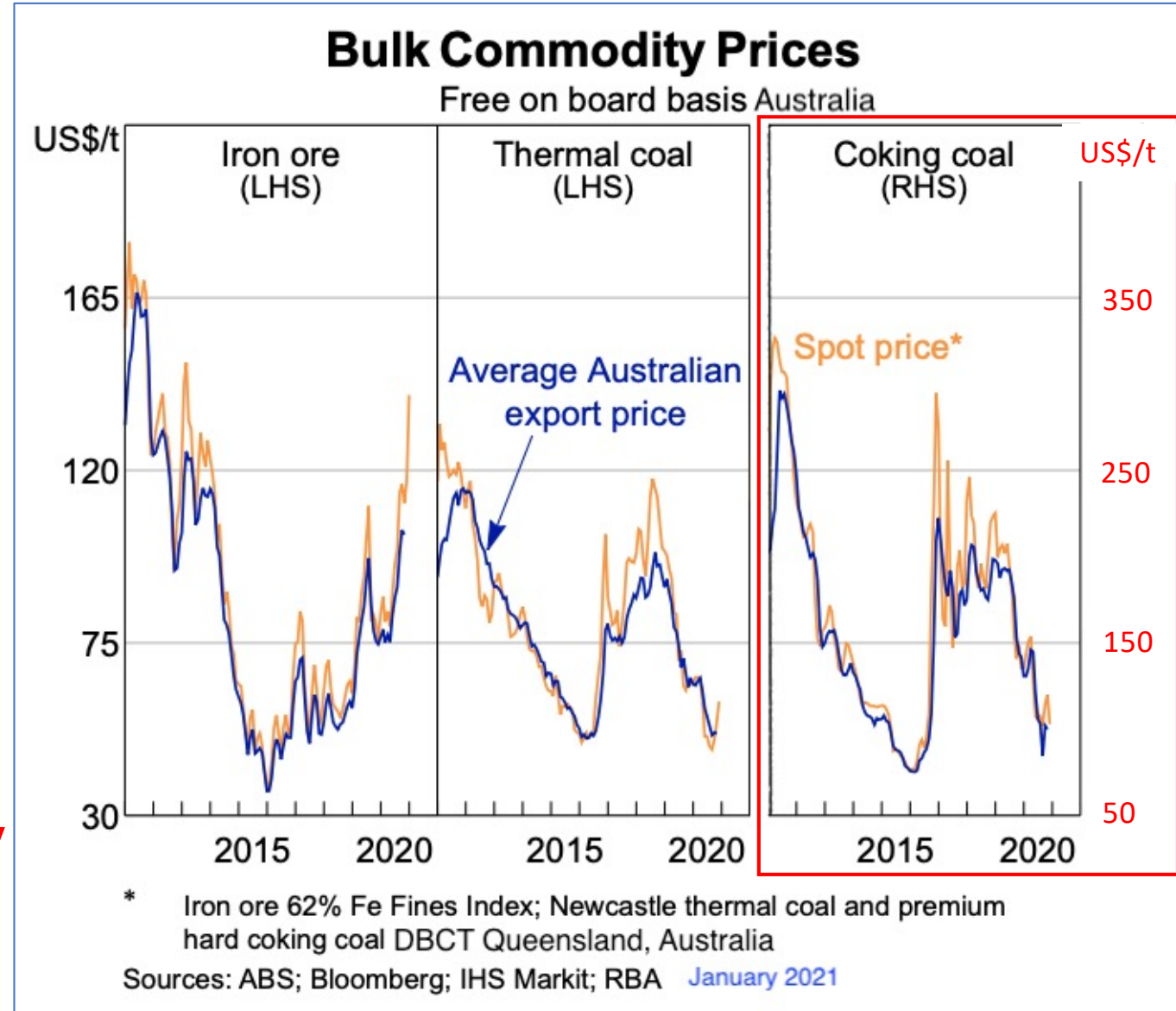
* PCI is Pulverized Coal Injection into the Blast Furnace. Source: IEA Dec'20.

5. Future Seaborne Coking Coal Markets and Iron Production

- Projected Met-Coal exports by land & sea vs 2018 decline to ~94% for 2021 and ~88% for 2025.
- Seaborne is 85-90% of total Exports.
- Forecast for World Blast Furnace Ironmaking: Peaks at **1.36bln Tonnes** in 2019 – 2021;
- Blast Furnace Ironmaking gradually declines to **1.12bln Tonnes** in 2050. Blast Furnace process efficiency improvements and use of Direct Reduction, Hot Briquetted Iron will reduce Coke & Coking Coal demand further.
- Future growth in crude steel production will be produced by Electric Arc Furnace and Direct Reduced Iron processes.

6. Met-Coal Price Fluctuations and Benchmarking

- Significant global price fluctuations of Commodities responding to economy.
- International Coal Benchmarking for specific markets. Coal producers negotiate the price on a sliding scale off these Benchmarks.
- Benga's economical assessment based on the projected long-term value of Prime Hard Coking Coal comparable to the Elk Valley's coal at US\$140/Tonne (fob DBCT port, Australia). Price PHCC in May'21 from US\$111 to US\$141/Tonne fob.
- Grassy product's quality is significantly below that benchmark, dropping off to approx. 80% of that value.

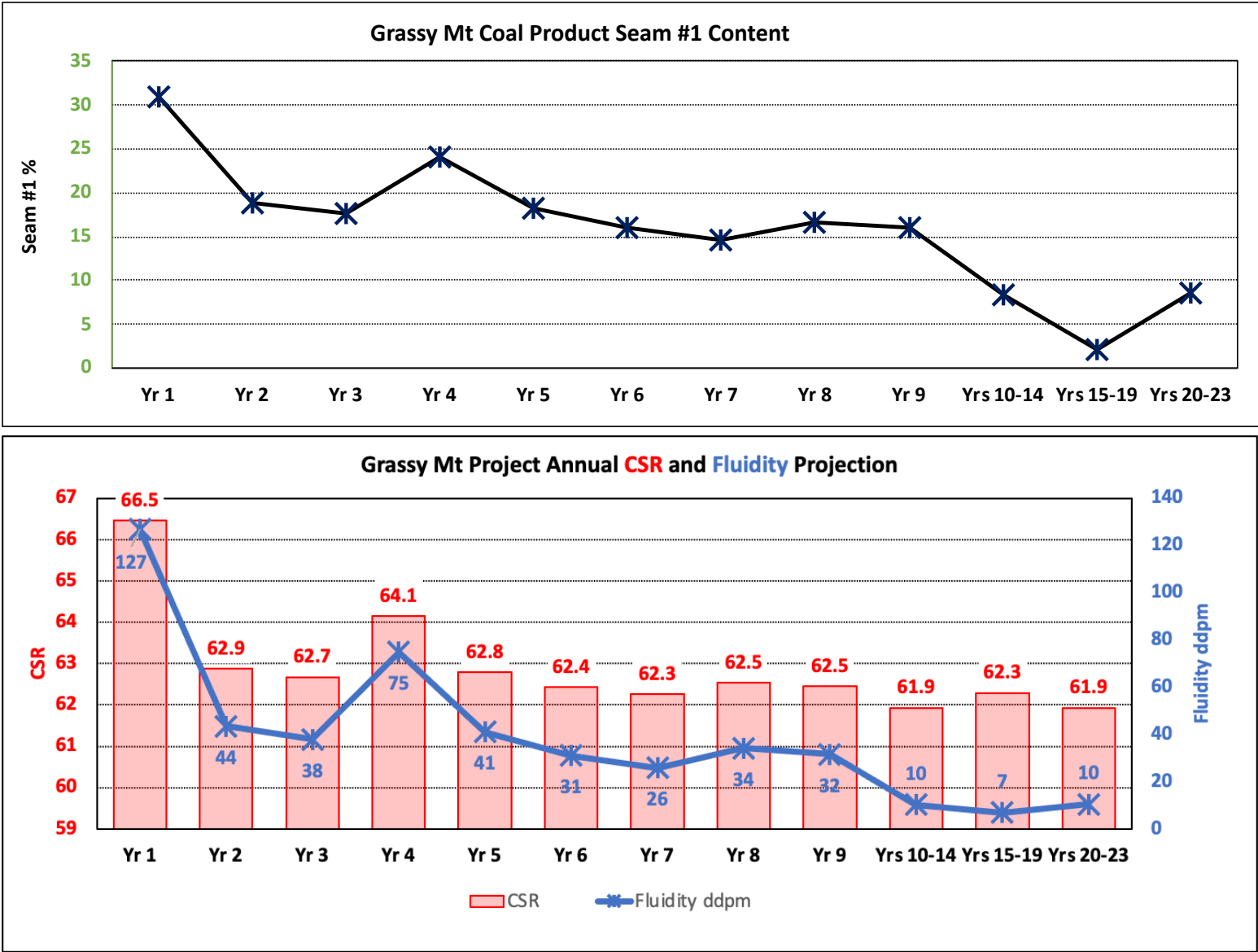


7. Crowsnest Coal Mining History & Shutdowns

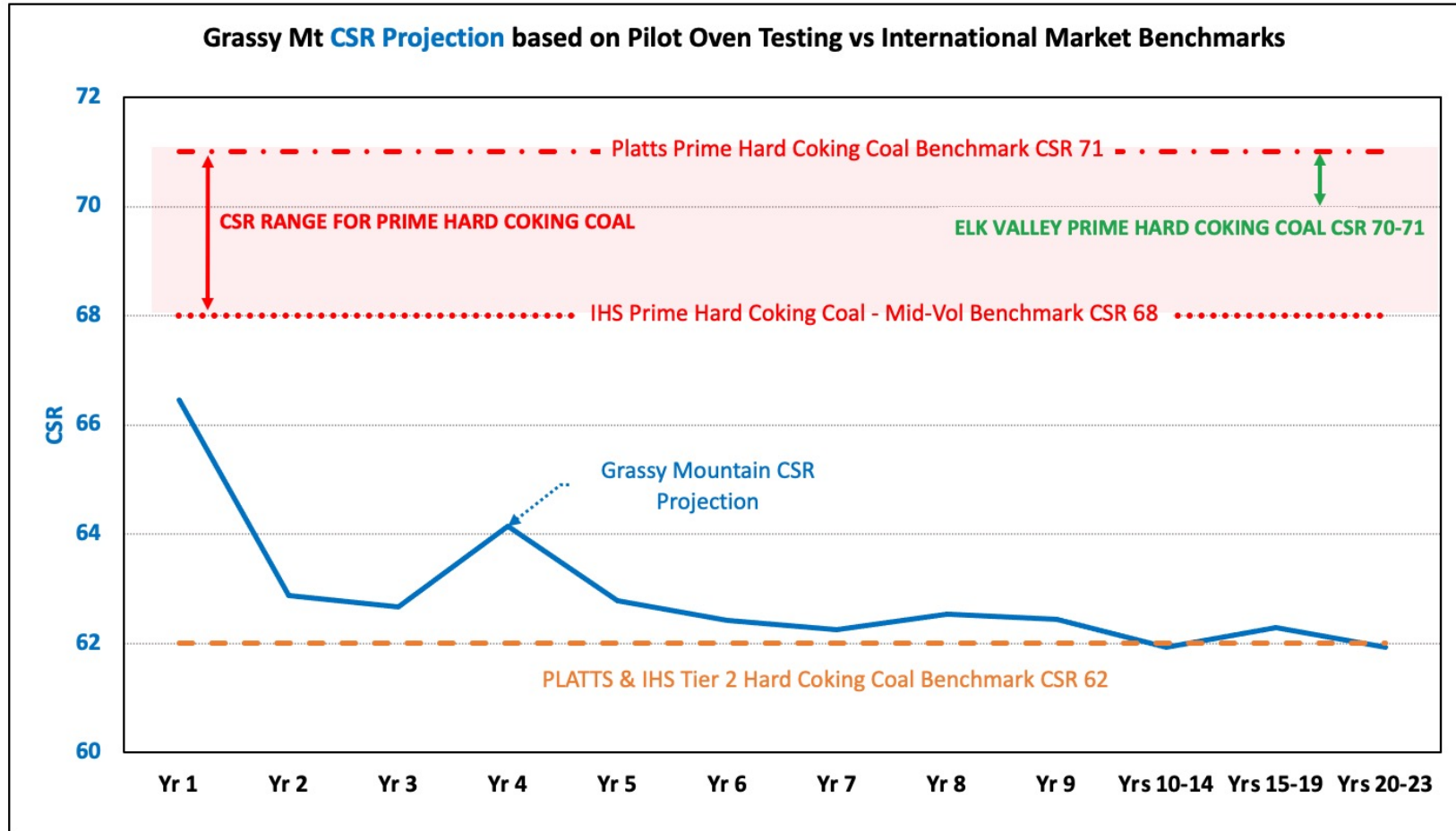
- Alberta Metallurgical Coking Coal Mines east of the BC Border and the Crowsnest Pass area, from Bellevue to Coleman, were shutting down in 1960's and 1970's. Grassy Mountain shut down in 1960. Tent Mountain was the last to shut down, operations suspended in 1979, officially shut down in 1983.
- The mines shut down due to inadequate quality and low market value of their Metallurgical Coal, combined with increasing quality requirements for the modernizing steel industry.
- The Japanese Steel Industry were key customers and partners in these mines. Their rejection of the coal and withdrawal triggered most of the shutdowns.
- As the shutdowns were taking place, the Elk Valley coal Resources in BC became technically and economically viable, utilizing improved mining technology and equipment suitable to more challenging mining conditions. These start-ups produced considerably higher Quality and Market-Value Metallurgical Coal: Balmer / Elkview (1968), Fording River (1972), Line Creek (1981) and Green Hills (1983).

8. Grassy Mt. Product Quality Decline - 23 Year Mine Life

- Grassy’s product is a blend of 3 Seams. Seam #1 has the highest quality but is only ~16% of the Coal resources.
- As the product’s Seam #1 content declines over the years, CSR and Fluidity decline. (Based on Pilot Oven Testing.)
- Over the production years, Grassy Mountain’s product Market Value and Mine Revenues decline. The lowest quality and value is likely be from year 10 onwards.
- This decline occurs as mining costs increase.

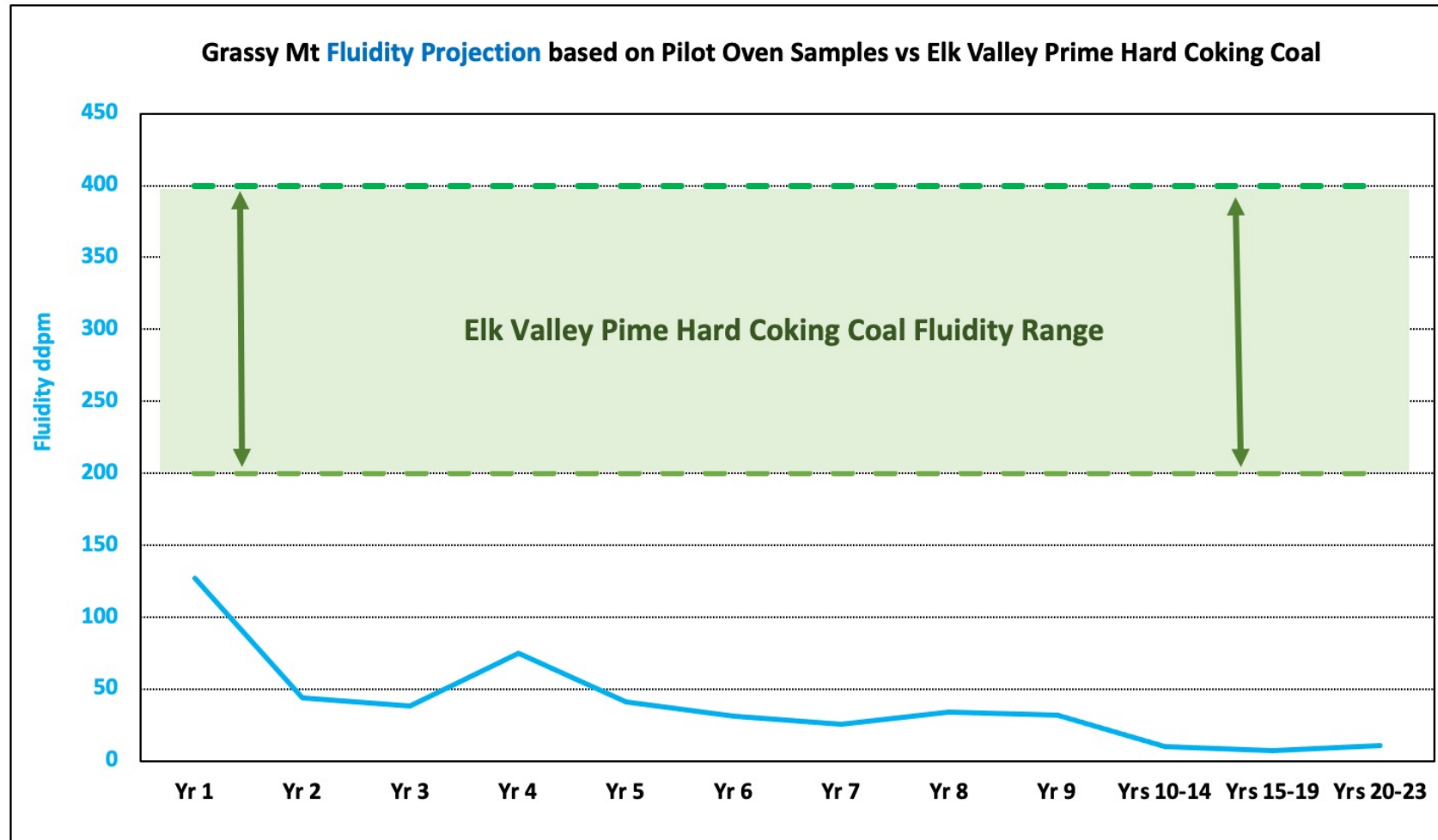


9. Product Quality - CSR Decline vs Market Benchmark – 23 Year Mine Life



- Red Band: Quality desired for Top-Value Prime Hard Coking Coal
- Blue graph: Actual quality Grassy's Product – Mostly lower value Tier-2 coking coal.

10. Product Quality - Fluidity Decline vs Elk Valley Product

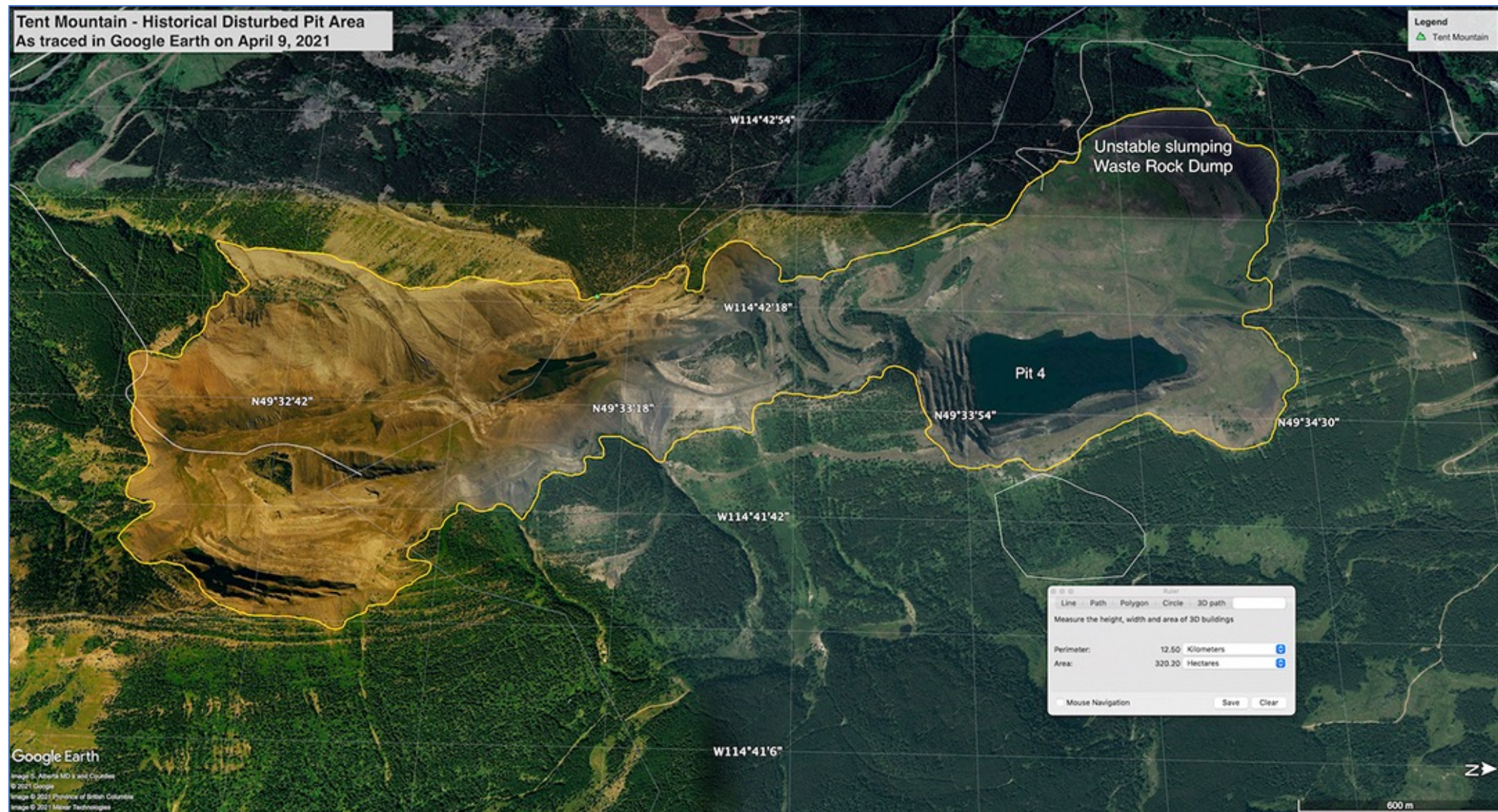


- Green Band: Quality desired for Top-Value Prime Hard Coking Coal
- Blue graph: Actual quality Grassy's Product – lower value Tier-2 coking coal.

11. Alberta - Other Mines & Projects and Mine Liabilities

- **Hancock Prospecting** (a major Australian Iron Ore producer) acquired **Riversdale Resources/Benga** in May 2019 for \$700mln. Benga was complicit in the Mozambique Met-Coal mining fiasco; Rio Tinto buying the project for US\$3.7bln in 2011, then selling the project for US\$50mln within 2 years.
- Examples of other Mines / Projects in Alberta:
 - **Montem Tent Mountain Mine:** Only 3.7mlnTones Measured Resources; ongoing exploration, significant uncertainty regarding Coal Quality and Market Value. Pilot Oven Coke CSR 50-55. Theoretical Modelling: Coke CSR 60-65, Tier 2 Coking coal at best. Will submit EIA license applications & permit amendments incl. water license, planning to restart Tent Mt mine exports in 2023, production 1.2 – 1.8 mln Tonnes/y.
 - **Montem Coal Chinook Project** north and south of Coleman. Resources Indicated and Inferred only, no Measured Resources. Comparatively low value Coking Coal, CSR 45-60. Only 1 drill hole CSR 70 from Chinook-Vicary. Uncertain, variable coal quality, indications of oxidation. Low confidence economic modelling, scoping study level +/- 40% (ASX Announcement, Appendix B pages 19 & 32, February 9, 2021.)
 - **ATRUM/ELAN:** Measured Resource 7mlnTonnes only for planned mine production 6mlnTonnes/Y. Claims Tier 1 Hard Coking coal, but resource significant variability is evident. Updated Scoping Study of December 2020, cautionary quotes: “A preliminary technical and economic study” and “based on low accuracy level” and “no certainty of eventual conversion to Ore Reserves”. Further Exploration is Required.
 - **Grande Cache / CST** – Underground closed in 2015. Operated a Surface Mine. On/off operation since 1972. The Mine developed resource, quality and revenue issues over the years. The mine remained closed during the winter of 2020/21. Various owners over the decades incl. bankruptcy. Acquired by CST July 2018.
- At present Alberta has \$30bln abandoned mine liabilities, compared to \$2bln in Alberta’s remediation funds.

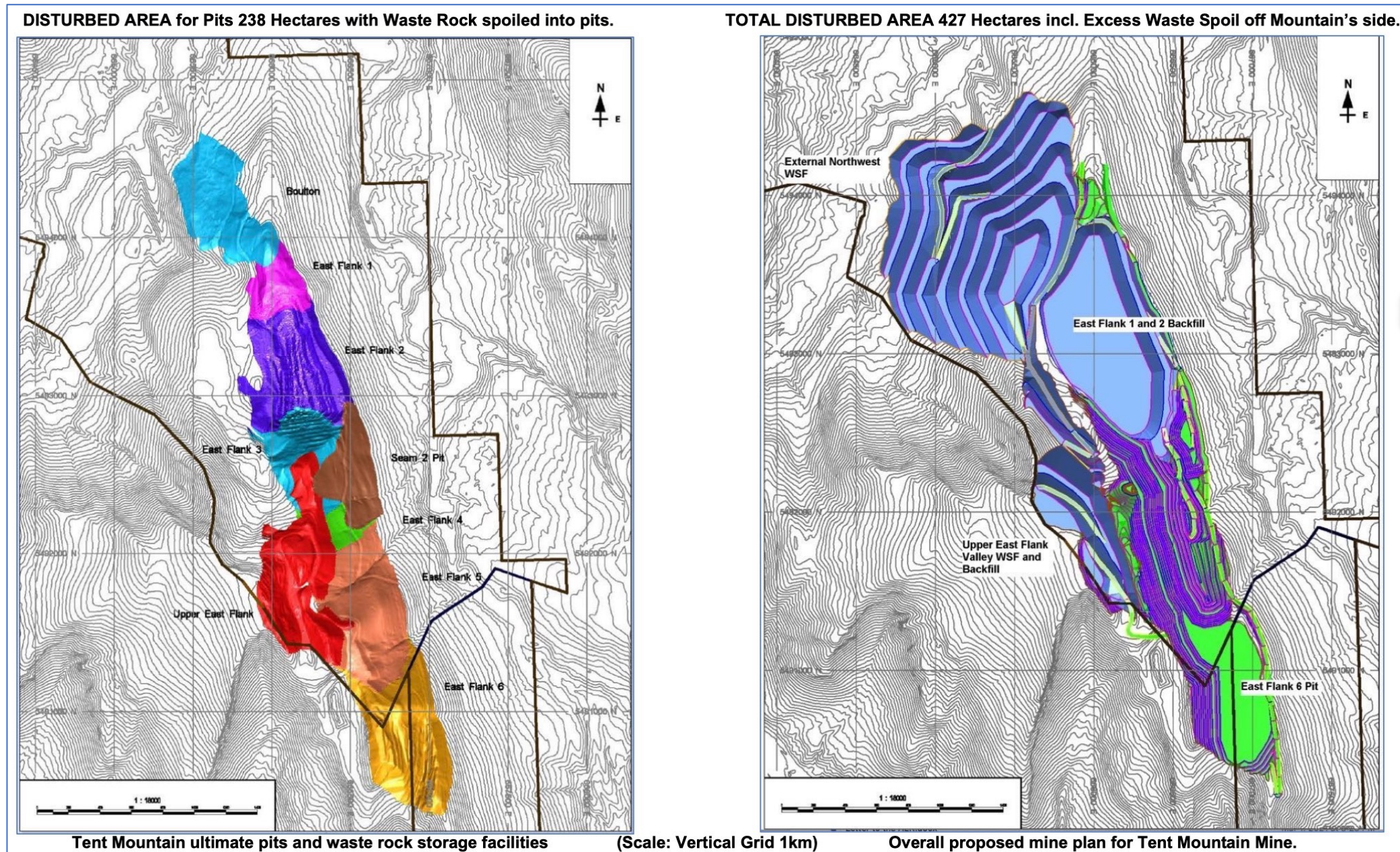
12. Montem Tent Mt Mine Present Condition



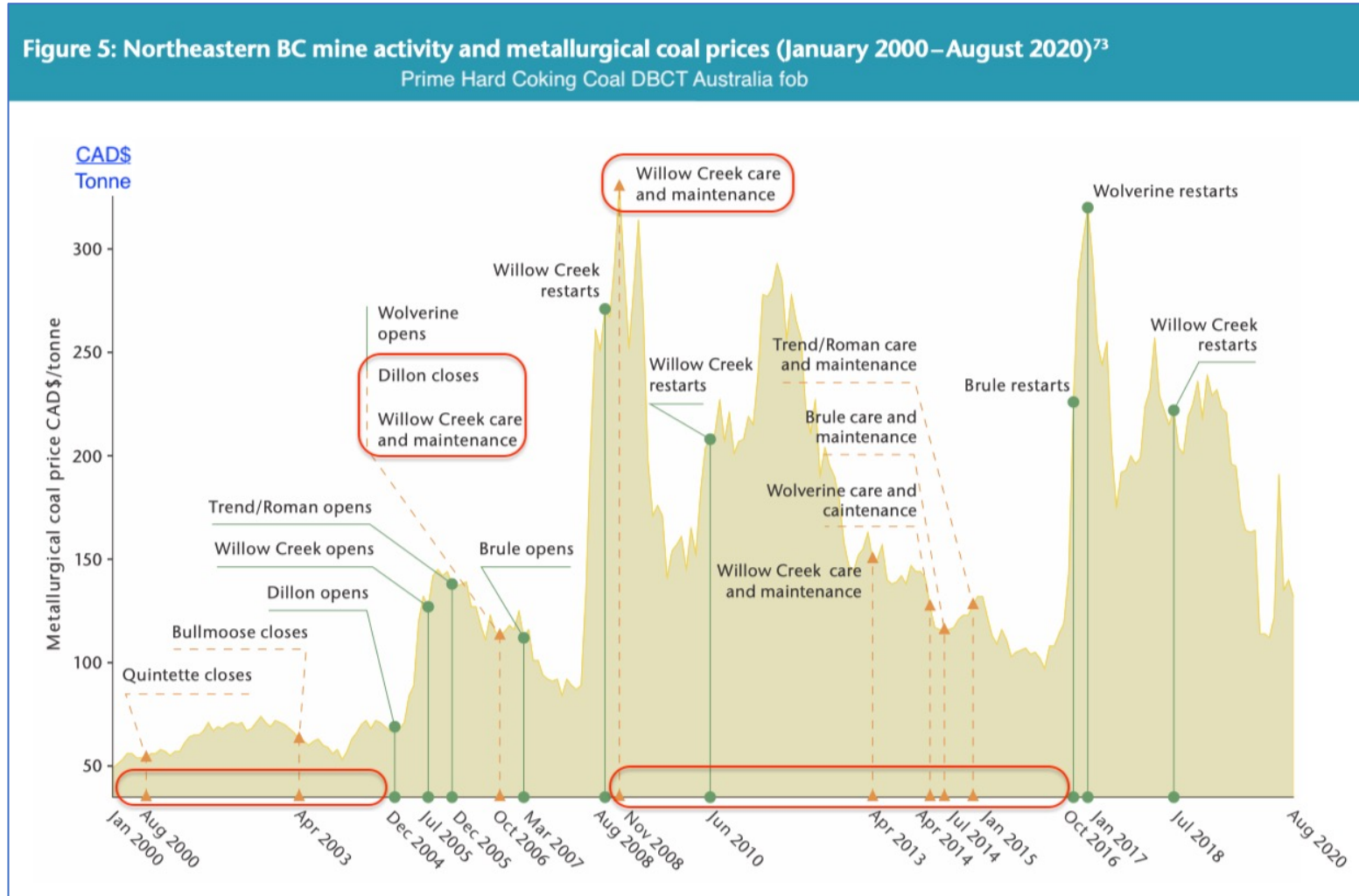
Tent Mountain's Total Mine Pit and Waste Dump area, scaled off Google Earth is approx. 320 Hectares

13. Tent Mt Mine - Ultimate Pit Area and Pit + Spoil Area

- Planned Mine Life 14 Years
- Left: Ultimate Pit Area 238 Hectares.
- Right: Ultimate Pit + Spoil Area 427 Hectares.
- Broken up Waste Rock Volume increase +30%. All won't fit in the pits. Excess waste is Spoiled along slopes.
- For each 100 Hect. Pit, 80 Hect. Spoil Area outside Pits.
- Runoff & Selenium management will be challenging & costly.



14. A Cautionary Tale from three NE British Columbia Mines - Open/Close



- Willow Creek, Brule and Wolverine Mines: Western Can. Coal, bought by Walter 2011, bankrupt 2016, bought by Conuma.
- Swing-mines opening and closing due to low market prices and product quality issues. Closed 1/3 of the time.
- Inconsistent profits, net business losses \$1bln 1999 – 2016. Uncompetitive with the BC Elk Valley Mines.

15. A Cautionary Tale from three NE BC Mines – Unfulfilled Promises

Table 1: Financial and economic promises compared to actual results: Willow Creek, Brule and Wolverine mines, BC 1999–2019 ²				
	Promised	Achieved	Actual results as a percentage of promised	Overstatement of promised to actual results
Corporate tax (millions)	\$250	\$86	34%	2.9 times
Employment (person-years ³)	12,245	7,260	59%	1.7 times
Coal production (millions of tonnes)	84	31	37%	2.7 times

- Infrastructure for the mines was subsidized by BC Government.
- In 2018 -2019 Conuma paid US\$225mln in dividends to shareholders.
- In October 2020 Conuma received \$120mln Canada Enterprise Emergency Funding
- No real economic gain for BC. No Job Security.

16. CONCLUSIONS (1)

- a) Benga overstated the quality and market value of Grassy Mountain project's coal product. The quality and value of its Tier 2 product are inferior to the Elk Valley's Prime Hard Coking Coal products. Product quality will rapidly decline after the initial production years. Coal pricing on the international market is highly volatile.
- b) Grassy Mountain's product quality's decline is highly likely to generate inadequate cash flow after year 10, if not earlier. It is advisable to consider the impact of Benga entering bankruptcy around year 10 of project life, potentially leaving a \$48mln gap between the Mine Financial Security Asset-to-Liability Program and clean-up costs at year 10.
- c) Benga is unable to properly predict, monitor and mitigate or remediate environmental impacts of the project. Benga refused to produce a complete Environmental Impact Assessment (EIA). Many reclamation projects likely to be unfinished / proven not to work.
- d) Referring to the track record of BC's NE coal mines, Grassy Mountain is unlikely to provide significant tax and royalty revenues and consistent employment at the levels projected by Benga. Grand Cache – CST mine is a swing-mine in West-Central Alberta with similar issues, only producing when market prices are sufficient.

16. CONCLUSIONS (2)

- e) Montem's Chinook over-all product quality north and south of Coleman and therefore its market value is unlikely to exceed Benga's product quality and market value. Tent Mountain mine's best Tier 2 product quality and market value will be inferior to the Elk Valley's Prime Hard Coking Coal products.
- f) Alberta's Eastern Slope mining projects appear to be mostly speculative, promoted by penny-stock companies:

Montem's ASX shares were A\$0.09 (25May21), down from A\$0.28 (25Nov20). Share Trading officially halted 17Feb21, resumed trading 19Feb21.

ATRUM's ASX Shares were A\$0.25 when trading halted 09Feb21 and suspended from trading 11Feb21, down from A\$0.39 (30Dec20). Trading resumed 26Mar21 at A\$0.07. Shares were A\$0.05 25May21. Underwriters terminated their Agreement on 15Mar21.
- e) The impact of mining on the Rockies Eastern Slopes' Watershed, reduced and polluted waterflow, should be weighed against Alberta's high dependence on the irrigation sector. Irrigation adds \$3.6 billion to Alberta's GDP, including sales and processing, of which \$1 billion from the Oldman River Basin. Alberta grazes approx. 41% of Canada's Beef Cattle (1.5 million head).
- f) Alberta Government's proposal to increase the allocation of Oldman River Basin water for Industrial use from 14% to 63.9% (February'21).
- g) The issue is cross-border; a compromised water supply will also impact Saskatchewan's and Manitoba's water security (1969 Master Agreement on Apportionment and Water Quality Objectives – incl. Selenium).
- h) Tourism revenues will be affected negatively. Alberta gets over \$8 billion tourism expenditures.

17. References and Links

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- Slide Presentation “Grassy Mountain Project Pilot Oven Carbonizations and Lab Results Analysis” (01Nov20), C.Kolijn, Document #777: <https://www.ceaa-acee.gc.ca/050/documents/p80101/136594E.pdf>
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- IHS Markit Coking Coal Methodology and Specifications December 2019 <https://cdn.ihs.com/Coal-Methodology/IHS-Energy-coking-coal-methodology.pdf>
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- Who will pay the \$17.8 billion mining rehabilitation bill? (Coal mines, Qld & NSW, Australia) <https://reneweconomy.com.au/69725/>
- Oldman Watershed Council, Final Statement of September 21, 2020 <https://iaac-aeic.gc.ca/050/documents/p80101/136088E.pdf>
- The farce of new coal mines S.Shibley, D.Yewchuk Law Clinic UofC <https://ab4coalfreerockies.ca/learn-more/the-farce-of-new-coal-mines>
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